

The Effect of Exposure Frequency on Incidental Vocabulary Acquisition

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ABSTRACT

This study explored the effect of incidental vocabulary exposure on receptive and productive vocabulary knowledge, acquisition and retention among 90 Iranian EFL learners. The research focused on how exposure frequency or the number of encounters with the target words in reading passages affected different aspects of vocabulary knowledge such as receptive and productive knowledge of orthography, parts of speech, associations and meaning. In general, the findings (based on ANOVA and its non-parametric version, Kruskal-Wallis whenever normality requirement was not met) indicated that incidental exposure to second language (L2) words through reading passages might be conducive to vocabulary acquisition and retention. Particularly, it was revealed that as the number of encounters to L2 target words increased, the learners were more successful in acquiring different aspects of vocabulary knowledge. In this regard, the effect of exposure frequency was significant in both the immediate and delayed post-test for all aspects of vocabulary knowledge when the amount of exposure increased from one encounter to seven. Nevertheless, the analyses of the scores obtained from the seven subtests suggested that the effect of exposure frequency may vary for different aspects of vocabulary knowledge. Moreover, there was no marked distinction between receptive and productive aspects of vocabulary knowledge. However, the scores on the semantic subtests revealed that increasing the number of exposure frequency could mostly affect the receptive knowledge of meaning and form as well as productive knowledge of associations. These aspects were also more vulnerable with the passing of time. It is recommended that English teachers put incidental vocabulary acquisition within the perspective of a longitudinal, intensive and systematic vocabulary recycling where the learners' knowledge of vocabulary is reinforced and accumulated over time. Moreover, English teachers may make use of form-focused or explicit instruction to compensate for any lack of time or their learners' need for more incidental exposure to L2 vocabulary.

Keywords: exposure frequency; incidental vocabulary acquisition; vocabulary knowledge; Iranian EFL learners; retention

INTRODUCTION

Interest in second language (L2) vocabulary acquisition has increased in recent years particularly after the need for further research on this neglected domain of language acquisition (Meara, 2009) was asserted by pioneer vocabulary acquisition researchers (Webb, 2007; Schmitt, 2008; Meara, 2009). Along this line of research, many scholars have investigated the acquisition and development of vocabulary knowledge within the context of reading which has come to be called incidental vocabulary acquisition (see for example, Tekmen & Daloglu, 2006; Webb, 2007; Chen & Truscott, 2010). Despite serious debates on the extent to which an incidental (that is, implicit) approach to vocabulary acquisition can be conducive to significant gains in vocabulary knowledge especially in the long run (see Schmitt, 2008; Shintani, 2013), many scholars believe that learning new vocabulary while reading passages (that is, written input) is the main context of vocabulary development particularly in intermediate and advanced stages of both the first language (L1) and L2 language acquisition (Rott, 2013).

A fundamental question, however, needs to be answered before any investigation within the perspective of either incidental or intentional (explicit) vocabulary acquisition is conducted: What does knowing a word entail? To this end, vocabulary knowledge as a multifaceted construct has been mainly described in terms of binary distinctions such as breadth versus depth of vocabulary knowledge where the breadth (or size) refers to the number of words learners know and depth implies the degree of mastery over various uses of L2 vocabulary (see for example, Qian & Schedl, 2004; Webb, 2013). Likewise, following Nation (2001), vocabulary knowledge has been defined as incorporating both receptive and productive forms of sub-knowledge in three domains, which are form, meaning and use based on which knowledge of vocabulary at recognition and production levels respectively can be measured (Nation, 2001; Qian & Schedl, 2004; Webb, 2007).

Regardless of different definitions proposed by scholars, it is generally agreed that knowledge of L2 vocabulary entails knowing different denotations and connotations a word has, together with orthographic, syntactic and pragmatic functions it takes in written and spoken contexts both at the level of recognition and production (Hellman, 2011; Heidari-Shahreza & Tavakoli, 2012). Based on such multidimensional view of vocabulary knowledge, the present study aimed at investigating the effect(s) of varying amount of exposure frequency or the number of encounters to target words (TWs, hereafter) while reading English passages.

LITERATURE REVIEW

Research into the possible effects of exposure frequency (or number of repetition, interchangeably) on incidental L2 vocabulary acquisition began with Saragi, Nation and Meister's study (1978). Their participants, who were native speakers of English, read the English novel, *A Clockwork Orange*, in which Russian slang words were embedded. The findings showed that the learners were able to acquire incidentally 75 percent of the TWs. They also found a correlation of 0.34 between the number of encounters to the TWs and whether they were acquired or not. Later, Horst, Cobb and Meara (1998) criticized this study for its artificial context and in a follow-up study using graded readers found a correlation of 0.49 percent between exposure frequency and incidental acquisition of the TWs. They concluded a minimum frequency of eight was needed for significant gains in vocabulary knowledge. However, their findings were affected by extraneous factors such as whether or not the TWs were accompanied by pictures.

Following the same line of research, Rott (1999) investigated the incidental acquisition of 12 TWs by 95 German English as a foreign language (EFL) learners. She found that even two encounters could bear significant results that was in sharp contrast with Hulstijn, Hollander and Greidanus' findings (1996) where they reported no significant difference in learning gains between one to three encounters.

In almost similar studies, Waring and Takaki (2003), Pigada and Schmit (2006), and Brown, Waring and Donkaewbua (2008) further explored the incidental acquisition and retention (or recall) of vocabulary knowledge. Despite some methodological differences, their findings generally confirmed that the knowledge of form, meaning recognition and meaning recall respectively were among the most affected aspects of vocabulary knowledge when the number of encounters to the TWs increased ranging from one to more than 20 times both immediately or after a period of time. While these studies took an important step toward a better understanding of how the amount of exposure to L2 words through reading passages could affect vocabulary knowledge and retention, they were limited in that their measuring tools underrepresented the multifaceted trait of vocabulary knowledge. That is, the tests used in these studies were tests of form and meaning recognition (or recall), measuring whether or not the learners could remember the form or meaning of the TWs.

Webb (2007), Chen and Truscott (2010) and Heidari-Shahreza and Tavakoli (2012) also probed the same issue using a much improved taxonomy of vocabulary knowledge and measurement including receptive and productive knowledge of orthography, parts of speech, meaning and associations. Webb concluded that for sizeable learning gains ten encounters were required. Whilst, Webb (2007) found repetition affected receptive knowledge more than productive both on the immediate and delayed post-test, Chen and Truscott (2010) did not find the same effect on the delayed post-test. Heidari-Shahreza and Tavakoli (2012) reported that semantic aspects of vocabulary knowledge were most affected by increasing exposure frequency. However, they were also more vulnerable to the lapse of time.

These studies also had a number of shortcomings. While ecological validity was endangered in Webb's study by using invented words in isolated sentences, it was much improved in Chen and Truscott's where the TWs appeared in short reading passages. Nevertheless, the contribution of the TWs to the general meaning, informativeness and difficulty of the texts was not fully controlled. Heidari-Shahreza and Tavakoli's study was limited in that only 10 TWs were employed in which their semantic features especially their cultural connotations were not sufficiently controlled for. What was more, the selected TWs were actually taken from an earlier study by Paribakht (2005) which was mainly concerned with lexical inferencing rather than incidental vocabulary acquisition. These shortcomings were compensated for in this study by incorporating a greater number of TWs which were selected over a six-month period and within the perspective of a much larger research project, also investigating L1 lexicalization and cultural loadedness (to be reported). A longer period of time was chosen to assess the effects of exposure frequency on the retention of vocabulary knowledge. Finally, the cultural connotations of the words and the context in which they appeared were controlled for.

METHODS

Based on Heidari-Shahreza and Tavakoli's study (2012), the present study explored the possible effect(s) of exposure frequency (one, three or seven encounters to TWs) on successful incidental vocabulary acquisition by 90 Persian-speaking EFL learners. Retention was also taken into account. In other words, the researchers were interested in finding out the extent any observed gain in learners' vocabulary knowledge was retained after three weeks. This study sought to answer two important research questions:

1. What are the possible effects of exposure frequency (or number of exposures to TWs) on EFL learners' incidental acquisition of vocabulary knowledge?
2. How would the observed effects of exposure frequency, if any, vary after three weeks?

PARTICIPANTS

The participants of this study were 90 Iranian university students with an average age of 20.5. First, the Oxford Placement Test was administered to 128 first and second-year students through which 111 were deemed to be at intermediate level. This test contained 50 multiple choice questions which measured learners' knowledge of key grammar and vocabulary, a reading passage with 10 graded comprehension questions and a writing task that tested the participants' ability to produce the language. Secondly, these students took the Vocabulary Levels Test (Nation, 1990) which is a widely-used test to assess learners' vocabulary knowledge (Schmitt, Schmitt & Clapham, 2001). All participants scored 25 or more (out of 30) on the 2000 level of the Vocabulary Level Test, with an average score of 28.2, indicating that they had mastered that level. Finally, the researchers made and distributed a socio cultural background survey to ensure that the participants were sufficiently homogeneous in their linguistic and socio cultural background. This survey had two extensive parts. The first part generally contained questions on participants' age, gender, level of education, native and foreign (or second) language(s) spoken and how they learned them. The second part was mainly concerned with when, where, to what extent and for which activities the participants used their native and foreign language(s). This part also included questions on whether or not they had traveled to (or stayed in) any foreign countries. Based on this survey, it was revealed that, among other things, all participants did not have any significant exposure to English except through high school English classrooms or sporadically through mass media such as television and movies. The participants were then equally divided into three quasi-experimental groups of 30, based on the number of encounters to TWs they were to receive (that is, E1, E3 and E7).

MATERIALS & INSTRUMENTS

TARGET WORDS (TWS)

There were 20 TWs which included eight verbs, eight nouns and four adjectives (see Appendix A). Following Web (2007) and Chen and Truscott (2010), the selected TWs were conceptually familiar to the participants and had the same difficulty level. Therefore, the researchers were careful enough not to include words which were far beyond the participants' current level of comprehension and acquisition. The TWs were also piloted with a similar group of participants to ensure their appropriateness. In addition, following Paribakht (2005), frequency of the TWs was taken into account through Collins COBUILD English Dictionary's (1995) word frequency categorization system. Finally, the researchers consulted two native experienced EFL instructors and (as mentioned) piloted the TWs with a group of 20 EFL learners who had almost the same characteristics as the final participants to ensure the suitability of the final TWs. It is also worth mentioning that the selected TWs were assured to be unknown to all the participants at the time of the study, based on a checklist which contained 150 words. The participants were asked to indicate their knowledge of these words. Then, the TWs were chosen out of the 43 words which were unfamiliar to all the participants.

READING PASSAGES

As Table 1 indicates, the participants, on the whole, read 13 reading passages during their regular class time and in about 50 minutes. Seven of these passages were main reading passages (M) which each contained all 20 TWs of the study. The other six reading passages, however, served as distractors (D) in which no TW was embedded. Yet, all reading passages had almost the same length (250 words) and the same difficulty level. The rationale behind the inclusion of both main and distractor passages was that the participants could read the same number of reading passages in spite of different amount of exposure to TWs (that is, one, three or seven encounters). The researchers together with two native speakers of English wrote and revised the main passages to ensure their appropriateness. The distractors, however, were selected from a reading textbook at intermediate level by Kirn and Hartmann (2002).

TABLE 1. Distribution of reading passages

| Group | Distribution of Main and Distractor passages | | | | | | | Exposure |
|-------|--|----------------|----------------|----------------|----------------|----------------|----------------|----------|
| E1 | D ₁ | D ₂ | D ₃ | D ₄ | D ₅ | D ₆ | M ₇ | 1 |
| E3 | M ₁ | D ₂ | D ₃ | M ₄ | D ₅ | D ₆ | M ₇ | 3 |
| E7 | M ₁ | M ₂ | M ₃ | M ₄ | M ₅ | M ₆ | M ₇ | 7 |

VOCABULARY POST-TEST

Following Chen and Truscott (2010) and Heidari-Shahreza and Tavakoli, (2012), a modified version of Webb's (2007) test of vocabulary knowledge was used. Table 2 shows the components of both receptive and productive aspects of vocabulary knowledge as a multidimensional trait.

TABLE 2. Receptive & productive measurement of vocabulary knowledge

| Order | Knowledge measured | Test type |
|-------|---|--------------------------|
| 1 | Productive Knowledge of Orthographic Form | Dictation |
| 2 | Receptive Knowledge of Orthographic Form | Multiple choice |
| 3 | Receptive Knowledge of Meaning and Form | Translation (L2-L1) |
| 4 | Productive Knowledge of Parts of Speech | Sentence construction |
| 5 | Productive Knowledge of Associations | Paradigmatic association |
| 6 | Receptive Knowledge of Parts of Speech | Multiple choice |
| 7 | Receptive Knowledge of Associations | Multiple choice |

SUB-TEST 1. PRODUCTIVE KNOWLEDGE OF ORTHOGRAPHIC FORM (PO)

To assess the productive knowledge of orthographic form which is concerned with the correct spelling of words, a dictation test was administered. The participants heard each TW twice from a player and had 20 seconds to write it down. Since phonological prompts rather than the treatment could affect the participants' performance (Webb, 2007; Chen & Truscott, 2010), even a minor error in spelling was marked as incorrect.

SUB-TEST 2. RECEPTIVE KNOWLEDGE OF ORTHOGRAPHIC FORM (RO)

To measure this aspect of vocabulary knowledge, the participants were instructed to choose the correct spelling of each TW in a four-option multiple-choice format. Distractors only differed in spelling. The following is for the TW, "masterpiece":

- a. masterpeace b. masterpiece c. mosterpiece d. masterpiese

SUB-TEST 3. RECEPTIVE KNOWLEDGE OF MEANING AND FORM (RMF)

To assess receptive knowledge of meaning and form, the participants were asked to translate the TWs to their L1 (that is, Persian). The learners' translations were expected to contain all essential semantic features of the TWs. Otherwise, their translations were scored as incorrect. Considering the word "hit" as an example, an answer such as "tap" was regarded as incorrect because the semantic feature [+ force] was not taken into account.

SUB-TEST 4. PRODUCTIVE KNOWLEDGE OF PARTS OF SPEECH (PP)

To measure this aspect of vocabulary knowledge, the test-takers were instructed to write English sentences in which the TWs were used in their expected grammatical functions. For instance, the TW, "smuggle" was expected to appear as a verb in a given sentence.

SUB-TEST 5. PRODUCTIVE KNOWLEDGE OF ASSOCIATIONS (PA)

As for this subtest, the participants were instructed to provide a word pragmatically associated with the TWs. For instance, for the TW "annoyance", a response such as "irritation" was regarded as acceptable. It is also worth noting that syntactic associations were discouraged.

SUB-TEST 6. RECEPTIVE KNOWLEDGE OF PARTS OF SPEECH (RP)

In each test item, three similar sentences were given which contained the TWs. The only significant difference among the sentences was the grammatical function of the TWs. The participants needed to select the sentence in which the TWs had the expected (correct) grammatical function. Taking the TW, "stubborn" as an example, only sentence (b) in which this word appears as adjective is correct.

- (a) The old carpenter was a real stubborn.
- (b) The old carpenter was really stubborn. ✓
- (c) The old carpenter behaved stubborn.

SUB-TEST 7. RECEPTIVE KNOWLEDGE OF ASSOCIATIONS (RA)

To measure receptive knowledge of associations, each TW was given together with four other words. The participants had to find out which two words were pragmatically associated with the given TW. The reason to solicit two answers from the learners was to enable the researchers to make sure if or not they had acquired all essential semantic components of the TWs (as in Chen, & Truscott, (2010) and Heidari-Shahreza and Tavakoli (2012). See the following example for the TW, "annoyance":

- (a) accident (b) feeling ✓ (c) boring (d) situation (e) angry ✓

These seven subtests were piloted with a similar group of participants. Subsequently, instructions were made clearer and several distractors were revised until the researchers were satisfied with the reliability and validity of the subtests. The average reliability was calculated as 0.85.

DATA COLLECTION

READING PASSAGES

As said above, there were seven main and six distractor passages. The participants in group E1 read all distractors and one of the main passages. Group E3 read three main and four distractor passages and group E7 only read main reading passages. Doing so, on the whole, all participants read seven passages. However, based on the group they were in, (that is, E1, E3 or E7) they had one, three or seven encounters to the TWs respectively. It is also worth noting the distractor passages were intentionally distributed in a way that the seventh text in all groups was a main reading passage. Therefore, there was no difference among the groups in how recently they had seen the TWs (See Table 1). The time allotted to the reading phase was 50 minutes. Therefore, on average, the participants had about seven minutes to read each reading passage. This duration was determined as sufficient through piloting procedure.

IMMEDIATE POST-TEST

Having read the reading passages, the participants took the vocabulary post-test. As shown in Table 2 above, this test was composed of seven subtests to tap various aspects of vocabulary knowledge. Each subtest was printed on a single page and the test-takers were instructed not to return to previous subtests. There was also no time limit to hand in the answer sheets. Nevertheless, the test did not take too long.

DELAYED POST-TEST

After a three-week delay, the researchers, once more, administered the vocabulary post-test to investigate the participants' retention of vocabulary knowledge. Fortunately, there was no participant attrition and the delayed post-test took place in the same manner as the immediate one. It is worth mentioning that the researchers considered the participants' university schedule and had several meetings with their professors to control for (as far as possible) any significant effect from the participants' exposure to English via their learning tasks or reading materials within these three weeks.

DATA ANALYSIS

To investigate the effect of exposure frequency on the acquisition of different aspects of vocabulary knowledge, the scores obtained from the immediate and delayed posttests were analyzed using SPSS ANOVA and its non-parametric version Kruskal-Wallis whenever normality requirement was not met. Post hoc tukey and least significance difference (LSD) tests were also used to locate significant effects (at $p = .05$). Details of the results are presented below.

RESULTS

EFFECTS OF EXPOSURE FREQUENCY IN THE IMMEDIATE POST-TEST

The mean scores and standard deviations on the immediate vocabulary post-test are presented in Table 3. As it implies, the participants in group E7 generally obtained higher scores than the other two groups in this test. Group E3 also outperformed the participants in E1. Therefore, it seems as the number of encounters to the TWs increases (from one to three and finally to seven encounters), the mean scores also improve.

TABLE 3. Mean scores and standard deviations on immediate post-test

| Group Sub-test | E1 | | E3 | | E7 | |
|---|----------|-----------|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Productive Knowledge of Orthographic Form | 1.31 | 0.68 | 1.93 | 0.82 | 3.46 | 1.98 |
| Receptive Knowledge of Orthographic Form | 3.47 | 2.12 | 4.15 | 2.55 | 7.78 | 2.77 |
| Receptive Knowledge of Meaning and Form | 1.68 | 0.59 | 4.02 | 2.19 | 7.31 | 3.35 |
| Productive Knowledge of Parts of Speech | 2.34 | 1.32 | 4.95 | 2.56 | 8.78 | 4.72 |
| Productive Knowledge of Associations | 1.46 | 0.85 | 3.62 | 1.63 | 8.01 | 4.28 |
| Receptive Knowledge of Parts of Speech | 4.23 | 2.13 | 7.04 | 3.49 | 7.79 | 3.36 |
| Receptive Knowledge of Associations | 4.12 | 2.34 | 6.60 | 2.62 | 7.11 | 3.54 |

Notes: *M* = mean; *SD* = standard deviation

While the difference between the three groups of participants (that is, E1, E3 and E7) was apparent, it was important to see if it could reach statistical significance or not. Based on the ANOVA and its post hoc tukey (or Kruskal-Wallis and post hoc LSD where the normality requirement was not met), the observed differences between E1 and E7 were statistically significant for all seven subtests. Furthermore, as Table 4 indicates, there were statistically significant differences between the mean scores of E3 and E7 on RMF, PP and PA sub-tests. Moreover, the participants in E3, in turn, obtained significantly higher scores than group E1 in Receptive Knowledge of Meaning and Form (RMF), Productive Knowledge of Parts of Speech (PP), Productive Knowledge of Associations (PA) and Receptive Knowledge of Parts of Speech (RP).

TABLE 4. Group comparisons on the immediate post-test

| Sub-test/Group | E1 vs. E3 | E3 vs. E7 | E1 vs. E7 |
|---|-----------|-----------|-----------|
| Productive Knowledge of Orthographic Form | 0.534 | 0.571 | 0.001* |
| Receptive Knowledge of Orthographic Form | 0.231 | 0.375 | 0.004* |
| Receptive Knowledge of Meaning and Form | 0.035* | 0.028* | 0.033* |
| Productive Knowledge of Parts of Speech | 0.038* | 0.004* | 0.000* |
| Productive Knowledge of Associations | 0.001* | 0.000* | 0.012* |
| Receptive Knowledge of Parts of Speech | 0.005* | 0.363 | 0.074* |
| Receptive Knowledge of Associations | 0.054 | 0.437 | 0.040* |

Note: * = $p < .05$

EFFECTS OF EXPOSURE FREQUENCY IN THE DELAYED POST-TEST

The results revealed that after a period of three weeks, the participants' scores in all seven subtests generally decreased (see Table 5).

TABLE 5. Mean scores and standard deviations on the delayed post-test

| Group Sub-test | E1 | | E3 | | E7 | |
|---|----------|-----------|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Productive Knowledge of Orthographic Form | 1.02 | 0.67 | 1.45 | 1.06 | 2.68 | 1.33 |
| Receptive Knowledge of Orthographic Form | 2.92 | 1.47 | 3.76 | 2.10 | 6.13 | 3.41 |
| Receptive Knowledge of Meaning and Form | 0.58 | 0.35 | 2.15 | 1.14 | 4.23 | 2.67 |
| Productive Knowledge of Parts of Speech | 2.22 | 1.41 | 3.45 | 2.27 | 5.69 | 5.43 |
| Productive Knowledge of Associations | 0.67 | 0.42 | 1.84 | 1.04 | 5.38 | 4.33 |
| Receptive Knowledge of Parts of Speech | 4.10 | 2.14 | 6.92 | 3.54 | 7.66 | 5.08 |
| Receptive Knowledge of Associations | 2.55 | 0.83 | 3.90 | 2.57 | 4.43 | 2.11 |

Notes: *M* = mean; *SD* = standard deviation

This decrease, however, was statistically significant only in the semantic sub-tests (RMF, PA and RA), with RMF mean scores reducing by 1.10, 1.87 and 3.08 respectively in the three groups, PA scores by 0.79, 1.78 and 2.63 and RA scores by 1.57, 2.70 and 2.68 (see Table 6).

TABLE 6. Significance of differences in immediate & delayed post-test

| Group Subtest | E1 vs. E1 (2) | E3 vs. E3 (2) | E7 vs. E7 (2) |
|---|------------------|------------------|------------------|
| Productive Knowledge of Orthographic Form | 0.123 | 0.547 | 0.732 |
| Receptive Knowledge of Orthographic Form | 0.187 | 0.298 | 0.441 |
| Receptive Knowledge of Meaning and Form | 0.025* | 0.012* | 0.021* |
| Productive Knowledge of Parts of Speech | 0.673 | 0.387 | 0.409 |
| Productive Knowledge of Associations | 0.003* | 0.032* | 0.019* |
| Receptive Knowledge of Parts of Speech | 0.455 | 0.376 | 0.518 |
| Receptive Knowledge of Associations | 0.000* | 0.033* | 0.027* |

Note: *= $p < .05$

It is also worth noting that although the participants' scores generally declined after three weeks (with a marked decrease in mainly semantic subtests), the statistically significant differences observed on the immediate post-test between the groups (i.e. E1 vs. E3, E3 vs. E7 and E1 vs. E7) still remained significant as shown in Table 7.

TABLE 7. Group comparisons on the delayed post-test

| Sub-test/Group | E1 vs. E3 | E3 vs. E7 | E1 vs. E7 |
|---|-----------|-----------|-----------|
| Productive Knowledge of Orthographic Form | 0.566 | 0.474 | 0.002* |
| Receptive Knowledge of Orthographic Form | 0.433 | 0.289 | 0.004* |
| Receptive Knowledge of Meaning and Form | 0.003* | 0.032* | 0.005* |
| Productive Knowledge of Parts of Speech | 0.025* | 0.012* | 0.001* |
| Productive Knowledge of Associations | 0.033* | 0.010* | 0.025* |
| Receptive Knowledge of Parts of Speech | 0.064* | 0.223 | 0.008* |
| Receptive Knowledge of Associations | 0.366 | 0.234 | 0.003* |

Note: *= $p < .05$

DISCUSSION

The present study explored the possible effects of exposure frequency on the incidental acquisition of receptive and productive knowledge of vocabulary. In general, the findings indicate that (incidental) exposure to L2 words through reading passages may be conducive to vocabulary acquisition and retention. Particularly, it was revealed that as the number of encounters to L2 TWs increased, the learners were more successful to acquire different aspects of vocabulary knowledge. In this regard, the effect of exposure frequency was significant in both the immediate and delayed post-test for all aspects of vocabulary knowledge when the amount of exposure increased from one encounter to seven (that is, E1 versus E7). Nevertheless, the analyses of the scores obtained from the seven subtests suggested that the effect of exposure frequency may vary for different aspects of vocabulary knowledge. For instance, while the participants obtained significantly higher scores on the semantic tests (that is, RMF, PA) even after three encounters, the same results were not observed for the knowledge of orthography, PO and RO tests (see also Chen & Truscott, 2010; Heidari-Shahreza & Tavakoli, 2012).

In addition, no significant difference was observed between receptive and productive knowledge of vocabulary in terms of acquisition and retention. For example, whereas the scores on both the receptive and productive knowledge of orthography tests (that is, RO and PO) did not reach statistical significance until seven encounters, significant results were obtained for the receptive and productive knowledge of parts of speech (that is, RP and PP subtests) even after three encounters (see however Webb, 2007). A complication here is that despite this consistent pattern, significant gains were observed even after three exposures for the productive knowledge of associations (PA), but the same effect was not observed for its receptive counterpart (that is, RA). That is to say, more than three encounters were needed for

this latter aspect of vocabulary knowledge to improve significantly (Chen & Truscott, 2010; Heidari-Shahreza & Tavakoli, 2012), also reached the same results). While further research is definitely required to account for such differences, it might be the case that RA subtest had been inherently more challenging for the participants as they were expected to recognize two correct options in each test item so as to receive the full score. Moreover, since L2 words evoke multiple links to other words even those in the learners' L1 (that is, various L1- and L2-oriented associations), the participants might be more easily misled by the test distractors in this subtest compared with the PA test where they had to merely provide one related word.

Finally, the findings showed that although learners' vocabulary knowledge may be improved via reading English texts incidentally, it might not be retained as much in passing time. As the comparison of the scores obtained by each group in the immediate and delayed post-tests revealed, the participants generally scored lower in the delayed posttest, administered three weeks later. Along with this general decline in the scores on all seven subtests of vocabulary knowledge, the semantic tests (that is, RMF, RA and PA) appeared to be significantly vulnerable to the lapse of time. This, which is in sharp contrast to Chen and Truscott (2010) but similar to Heidari-Shahreza and Tavakoli (2012) suggests that perhaps semantic aspects of vocabulary knowledge require a greater amount of exposure in a more intensive, systematic manner.

CONCLUSION

The focus of the current study was on the incidental acquisition and retention of 20 English TWs by 90 Iranian EFL learners. The researchers were particularly interested in investigating how the exposure frequency or the number of encounters to the TWs through reading passages affected different aspects of vocabulary knowledge. The findings generally revealed that an increase in the exposure frequency had positive effect on the acquisition and three-week retention of the TWs, especially if an index of seven encounters were to be used. Moreover, despite some insignificant differences, there was no marked distinction between receptive and productive aspects of vocabulary knowledge in terms of acquisition or retention. Being so, however, the scores on the semantic subtests revealed that increasing the number of exposure frequency could most affect the receptive knowledge of meaning and form (RMF) and receptive as well as productive knowledge of associations (RA and PA). Interestingly, these aspects were also more vulnerable to passing of time. Therefore, in short, it seems the semantic aspects of the TWs embedded in the reading passages were mainly affected by the number of encounters as far as an index of seven encounters and three weeks can tell.

While it is not safely possible to prescribe an optimal amount of exposure frequency to ensure acquisition and retention of different aspects of vocabulary knowledge, it seems advantageous for learners to read extensively in English (see Day & Bamford, 2002). This truism about extensive reading (that is, the more, the better) however is deterred in practice by the fact that EFL learners most often attend a limited amount of time per week in language classrooms (Tang & Nesi, 2003). Therefore, it is recommended that in addition to encouraging the learners to read extensively, English teachers could also make use of form-focused or explicit instruction to compensate for any lack of time or need for more incidental exposure (see Rouhi & Mohebbi, 2013; Shintani, 2013). In this regard, graded readers in which a specific number of words are embedded (and highlighted) seem a practical solution. Through this type of enhanced input, they will enjoy the merits of both the extensive reading and form-focused instruction (Schmitt, 2008; Luan & Sappathy, 2011).

Finally, as the results of the delayed post-test revealed, any gains through incidental vocabulary acquisition may decline in passing of time (see also Fitzpatrick, Al-Qarni &

Meara, 2000). Therefore, it is recommended that English teachers put incidental vocabulary acquisition within the perspective of a longitudinal, intensive and systematic vocabulary recycling where the learners' knowledge of vocabulary is reinforced and accumulated over time.

The present study had some limitations to keep in mind. First, despite its said methodological improvements on previous research, only a limited number of TWs with a small sample of EFL learners in one university was investigated. Secondly, different age groups other than adults and a larger sample encompassing other proficiency levels could enhance this study's generalizability (see for example, Shirani-Bidabadi & Yamat, 2012). Further studies may extend the scope of this study by investigating the incidental acquisition of a larger number of words by a more representative sample of participants in longer periods. In addition, adding qualitative measure of vocabulary assessment can improve the validity of the findings. Finally, it is recommended that interested researchers explore the possible effects of exposure frequency on the incidental acquisition of the words that usually appear as collocations or bear culturally-different connotations to see the extent the same results can be obtained.

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APPENDIX A

| SELECTED TARGET WORDS (TWS) | | | |
|-----------------------------|--------------|-----------------|---------------|
| explain (v) | elope (v) | gamble (v) | hang (v) |
| flee (v) | giggle (v) | date (v) | smuggle (v) |
| annoyance (n) | lounge (n) | pet (n) | junction (n) |
| masterpiece (n) | brunch (n) | undertaker (n) | wholesale (n) |
| stubborn (adj) | smoggy (adj) | abstinent (adj) | retired (adj) |

APPENDIX B

SAMPLE MAIN READING PASSAGE

- **Bold** words represent target words (TWs);

He was a **stubborn** person and it **explained** why he had few friends. What was more, he was too **abstinent**; he had never **gambled** or even as an young adult, **dated** a girl. Yet, strangely enough, there was some rumor in the neighborhood that he used to **smuggle** cocaine and **eloped** with his girlfriend once to Las Vegas. As a **retired** artist, he most often sat in the **lounge** of Hotel Mirage, 3 minutes away from his home, to eat his **brunch** and **giggle** at the travelers who came and went. Some actually thought he was idiot. But indeed, he was just alone and tired of his whereabouts. Few people liked him. While he was real **annoyance** to the hotel staff, Mr. Hathaway, the hotel manager was kind to him because old George once had presented his **masterpiece** to the hotel. It had been **hung** on the wall at Mr. Hathaway's office for years. There was a joke among hotel staff about the artist. They said you could not **flee** from two persons: an **undertaker** and old George. Anyway, he suited the **smoggy** city of Chicago well; where your best friend is your **pet**, usually a dog and where you meet your neighbors accidentally at the **junction** of a road or on a **wholesale** market.

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